Submarine Arm for *Explorer*

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Abstract:

Robotic arms have a multitude of uses in the modern world. One application for robotic arms is in the use of underwater exploration, often attached to small submarines or other submersibles. In this project, an electrical arm prototype will be created using an Arduino board and basic servo motors to construct an operational arm that is able to grab and hold small objects, and ideally will be attached to the submarine *Explorer*.

Fig. 1: Submarine *Explorer*

Introduction:

The University of Bridgeport has been given a submarine, *Explorer*, to take care of. *Explorer* is a one person submarine that has been designed to operate at depths of up to three hundred feet, but has only been tested up to one hundred and twenty feet. The builder of the submarine, Alan Winick, has expressed in the past the idea of creating arms to put on the submarine, one electrical and one hydraulic. The arm should be able to be operated easily, and be durable enough to withstand the underwater pressure it will experience under water. The arm will also be able to fold up against the hull when not in use so as to not be in the way when not in use.

Proposed Method:

The submarine arm that is to be constructed will have three joints and be operated by an Arduino board that will send signals to the three servo motors being used. The arm will have basic functions, primarily operating a claw at the tip to grab and hold small objects, as well have having two joints that will be able to rotate using a servo motor.

Detailed Drawings:

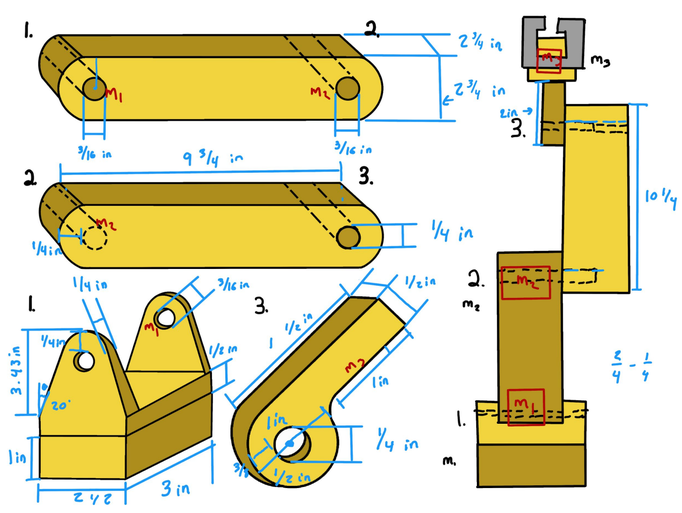

Fig. 2: Detailed Drawing (Exterior)

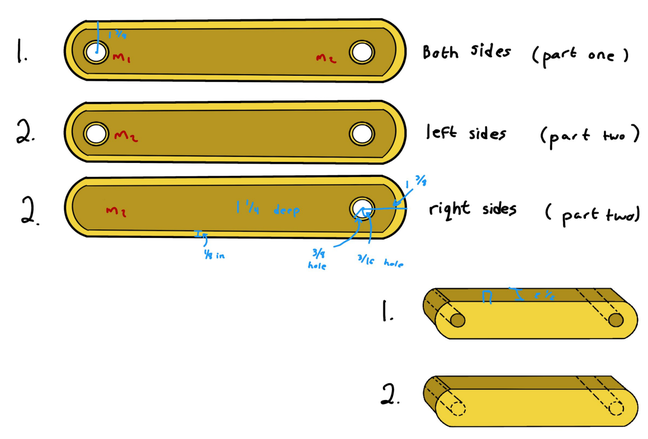

Fig. 3: Detailed Drawing (Interior)

CAD Models:

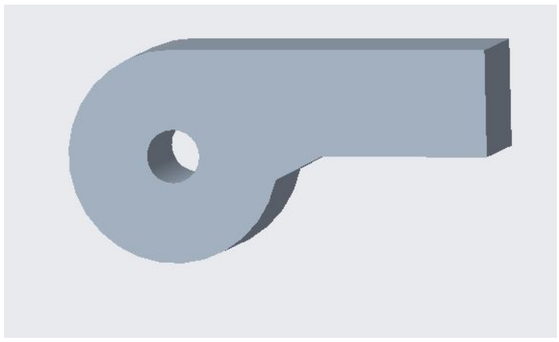

Fig. 4: Claw Attachment

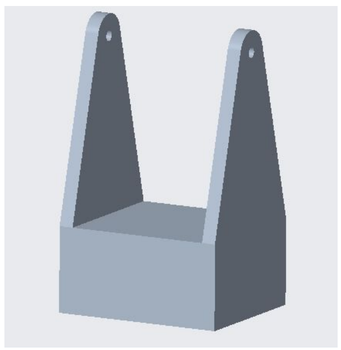

Fig 5: Base

Wiring Layout:

This is our first iteration of the wiring layout for our submarine arm. The wires will run through the exterior casings.

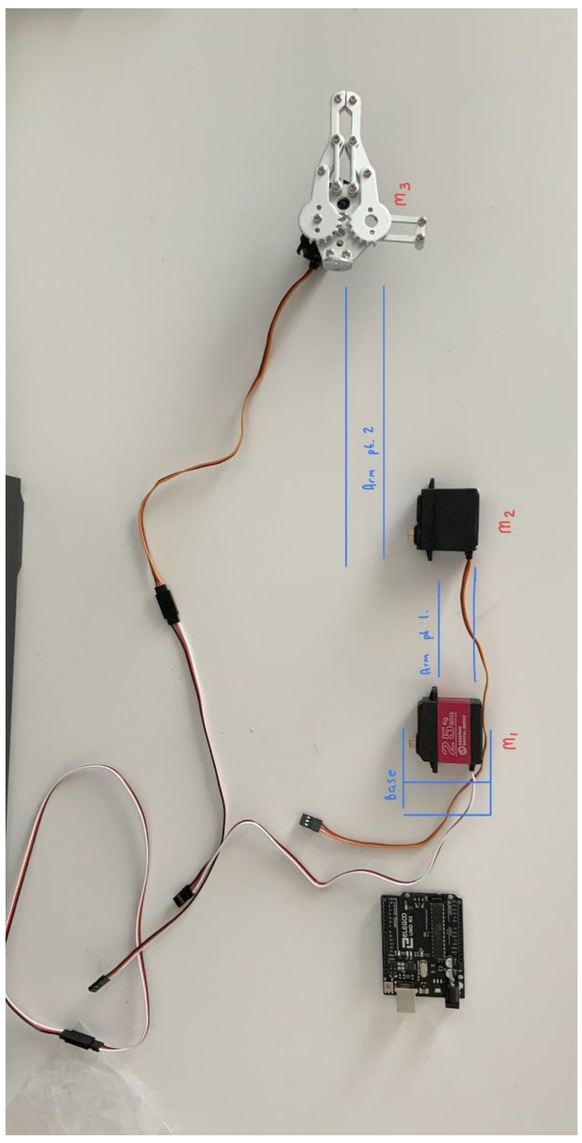

Fig. 6: Wire Orientation

Conclusion:

As of now, we do not have a complete arm just yet. Once the CAD Models are complete we will be able to 3D print our casings and other parts. We are also working on programming our Arduino to connect to the servo motors and operate in the way we need them to so that the arm can function properly. Once we have a functioning arm we will perform multiple tests to see how well the arm can function, as well as designing a breakaway function to eject the arm in the event that it gets stuck during use and cannot be untangled.